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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A61H 3/04 — A1

(11) International Publication Number: WO 95/31954

(43) International Publication Date: 30 November 1995 (30.11.95)

(21) International Application Number: PCT/US95/03990

(22) International Filing Date: 17 May 1995 (17.05.95)

(30) Priority Data:
08/246,455 20 May 1994 (20.05.94) US

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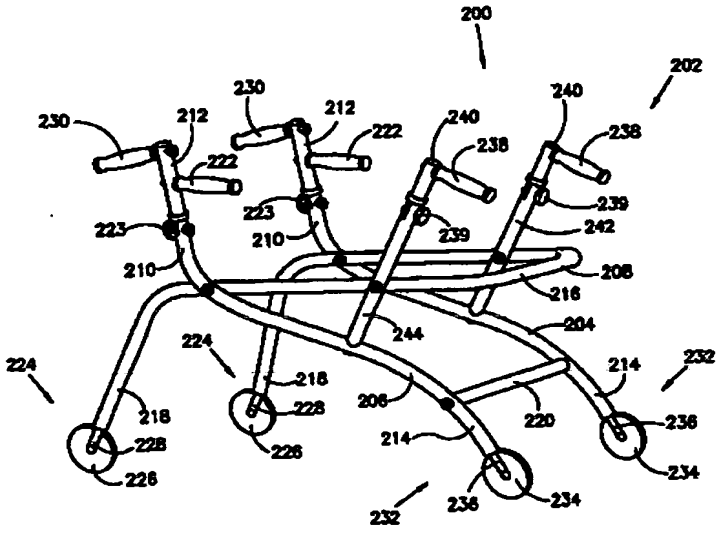
(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.

(54) Title: ROLLABLE WALKER



(57) Abstract

A rollable walker for traversing substantially level surfaces, including a frame (102), a pair of handles (112), a pair of rear wheels (124) and a pair of braking devices (128) for braking the walker. Each of the braking devices is slidable supported over one of the rear wheels in such a way that the application on the frame of a downward force of a magnitude greater than a pre-determined value urges the braking devices against the rear wheels to brake the rear wheels. The walker can be adapted for traversing stairs by including a pair of front wheels (130) connected to the frame, a second pair of braking devices for braking the front wheels and, preferably, two additional pairs of handles (222, 230) for use while ascending and descending stairs.

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"Rollable Walker"

FIELD AND BACKGROUND OF THE INVENTION

This invention relates to the field of walkers in general and in particular to rollable walkers for traversing substantially level surfaces, to steerable walkers for traversing substantially level surfaces and to walkers for traversing stairs as well as substantially level surfaces.

Walkers can be broadly broken down into two categories in which the first category of walkers are designed to provide assistance while traversing substantially level surfaces and the second category of walkers are designed to provide assistance while traversing stairs as well as substantially level surfaces.

Walkers for traversing substantially level surfaces generally include a four-legged frame as disclosed in U.S Patent No. 4,987,912 to Taylor and U.S. Patent No. 4,993,446 to Yarbrough, and suffer from the disadvantage that they have to be lifted during ambulation, thereby causing a high degree of fatigue of the user. To overcome the problem of having to lift walkers, rollable walkers have been developed which include the provision of at least one pair of ground engaging wheels, casters or gliders as disclosed in U.S. Patent No. 4,941,496 to Berning, U.S. Patent 4,953,851 to Sherlock, U.S. Patent No. 4,907,794 to Rose and others. However, rollable walkers suffer from the disadvantage of being somewhat unstable.

Other improvements over these walkers include the provision of a seat, sling or similar sitting device as disclosed in U.S. Patent No. 4,907,839 to Rose et al. and the provision of foldable frames for minimizing their storage space requirements and for facilitating their portability when they are not in use.

Walkers for traversing stairs as well as substantially level surfaces also generally include a four-legged frame as disclosed in U.S. Patent No. 4,922,940 to Lewy and again suffer from the disadvantage that they have to be lifted during ambulation. Further disadvantages of known walkers for traversing stairs are that there is no provision to accommodate the different

postures taken up by the user depending on whether he is climbing or descending stairs or traversing substantially level surfaces.

There is therefore a need for walkers which overcome the above disadvantages.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide a rollable walker for traversing substantially level surfaces. A further object of the present invention is to provide a steerable walker for traversing substantially level surfaces. A still further object of the present invention is to provide a rollable walker for traversing both stairs and substantially level surfaces.

Most users of walkers accomplish ambulation by repetitively lifting up and placing the walker in a forward position while standing still and taking a step forward while relying upon the walker for balance and support. Other users, who are unable to lift the walker, advance the walker by lifting one side of the frame at a time and pivoting the frame about the foot remaining on the ground. In both cases, it is true to say that the user particularly relies upon the walker for balance and support when he is taking a step forward and not when he is advancing the walker. Therefore, it can be appreciated that the design of a walker should accomplish two main goals. First, that the walker can be rolled on ground engaging wheels, rollers, casters and the like, thereby obviating the need for completely or partially lifting the walker. And second, that the inherent destabilizing effect of wheels be negated when the user is relying on the walker for balance and support.

Hence, to achieve the above-mentioned goals, there is provided according to the present invention, a rollable walker for traversing substantially level surfaces, comprising: (a) a frame; (b) a pair of rear wheels connected to the frame; and (c) a pair of braking devices connected

to the frame, each of the braking devices being slidably supported over one of the rear wheels in such a way that the application on the frame of a downward force of a magnitude greater than a pre-determined value urges the braking devices against the rear wheels to brake the walker.

The frame includes a pair of rear legs wherein each rear leg includes one of the braking devices and a pair of handles used for gripping and manipulating the walker during ambulation over substantially level surfaces. Preferably, each one of the handles is substantially deployed over and slightly forward of the pair of rear wheels.

The brake devices include a compression spring extending between a shoulder rigidly attached to a rear leg and a shoulder rigidly attached to a rear wheel. There are no rigid supports connecting the rear legs to the rear wheels and therefore each of the compression springs bears about at least 25% of the total load borne by the walker. It can therefore be readily appreciated that the rear legs are urged toward the rear wheels when the compression springs are compressed on application of a force to the frame. In other words, the clearance between the lower rims of the rear legs and the rear wheels are governed by the loads borne by the compression springs. When sufficient load is applied to the frame, the lower rims of the rear legs are urged against the rear wheels to achieve a braking action of the walker. To facilitate improved braking, the rims are configured to receive the rear wheels by preparing cutaway portions having the same radius of curvature as the traversal radius of curvature of the outer surface of the rear wheels.

The walker preferably further includes a seat for supporting a user in a sitting position, a basket for carrying provisions and freely rotatable front wheels such that the walker is steerable. Furthermore, the walker can be designed so as to be foldable for minimizing its storage space requirements and for facilitating its portability when not in use.

The walker can be adapted to support two additional modes of ambulation apart from traversing substantially level surfaces, namely, ascending stairs and descending stairs where a distinction is made therebetween because a user assumes different postures requiring different modes of support depending on the direction in which the stairs are traversed. In this instance, the walker further includes a pair of front wheels and a second pair of braking devices, where each of the second pair of braking devices is slidably supported over one of the front wheels in such a way that the application on the frame of a downward force of a magnitude greater than a pre-determined value urges the second pair of braking devices against the front wheels to brake the walker.

The frame includes a pair of front legs where each one of the front legs includes one of the second pair of braking devices, a second pair of handles for use while descending stairs and a third pair of handles for use while ascending stairs. Design features incorporated into the walker include that the second and third pair of handles are inclined such that they are substantially horizontal when the walker is used for descending and ascending stairs and that the frame is so configured such that the lines of action of the forces applied by the user lie substantially midway of the horizontal projection of the wheel base between the front wheels and the rear wheels when the walker is used for descending and ascending stairs.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 shows a perspective view of a steerable walker for traversing substantially level surfaces constructed and operative according to the teachings of the present invention;

FIGS. 2a and 2b show side and front views of the walker of Figure 1;

FIG. 3 shows a perspective view of the walker of Figure 1 in its folded arrangement;

FIG. 4 shows a detailed structural view of a handle of the walker along cross-section A-A of Figure 2b;

FIG. 5 shows a partly cut-away detailed structural view of a braking device of the walker;

FIG. 6 shows a detailed structural view of a braking device of the walker along cross-section B-B of Figure 2a;

FIG. 7 shows a side view along direction C of the wheel of the walker of Figure 6;

FIG. 8 shows a perspective view of a rollable walker constructed and operative according to the teachings of the present invention for traversing both stairs and substantially level surfaces;

FIGS. 9 and 10 show side and top views of the walker of Figure 8;

FIGS. 11 and 12 show the walker of Figure 8 supporting three modes of ambulation: traversing substantially level surfaces, descending stairs and ascending stairs;

FIGS. 13 and 14 show side views of a first embodiment of a foldable walker constructed and operative according to the teachings of the present invention for traversing both stairs and substantially level surfaces in its folded and unfolded arrangements;

FIGS. 15 and 16 show side and top views of a second embodiment of a foldable walker constructed and operative according to the teachings of the present invention for traversing both stairs and substantially level surfaces;

FIGS. 17 and 18 show side and front views of the second embodiment of the walker of Figure 8 in its folded arrangement;

FIG. 19 shows a perspective view along direction D of a quick release connector of the walker of Figure 17; and

FIGS. 20a and 20b show views of the quick release connector along cross-section lines E-E and F-F, respectively, shown on Figure 16.

DESCRIPTION OF THE PREFERABLE EMBODIMENTS

The present invention is of a rollable walker for traversing substantially level surfaces, is of a steerable walker for traversing substantially level surfaces and stairs and is of a walker for traversing both stairs and substantially level surfaces.

The principles and operation of the walkers of the present invention can be better understood with reference to the drawings and the accompany description.

Referring now to the drawings, Figures 1 and 2 show a rollable walker, generally designated **100**, constructed and operative according to the teachings of the present invention, for traversing substantially level surfaces.

Walker **100** includes a frame **102** fabricated from left and right upright members **104** and **106** connected by a crossbar **108**. Left and right upright members **104** and **106** and crossbar **108** are preferably made of anodized aluminum tubing. However, any other lightweight, rigid material, for example, plastics or other metal alloys, can be employed. Frame **102** is preferably foldable by pivotably mounting crossbar **108** to left and right members **104** and **106**.

Left and right members **104** and **106** include upper segments **110** for receiving handles **112** and lower segments in the form of front legs **114**. Crossbar **108** includes a generally U-shaped transverse element **116** for supporting a seat **118** and vertically disposed segments in the form of rear legs **120**. Handles **112** are deployed substantially over and slightly forward of the ends of rear legs **120** for rendering greater stability to walker **100** during ambulation. An inverted, generally U-shaped, brace **122** can be deployed for strengthening frame **102** and for supporting seat **118** about

pivot **109**. A basket (not shown) can also be provided for carrying provisions and personal items.

Walker **100** includes rear wheels **124** rotatably mounted on rear wheel supports **126** which, in turn, are received by rear legs **120** and braking devices, generally designated **128**, for braking rear wheels **124**. As will be described below in greater detail, rear wheel supports **126** are telescopically received by rear legs **120** such that rear leg **120** and rear wheel support **126** are vertically slidable with respect to one another for automatic activation of braking devices **128** when the user applies a downward force on frame **102** greater than a pre-determined value. Hence, in a sense, braking devices **128** act in a reverse manner to the deadman's handle found in locomotives and other means of transport.

Benefits of equipping walker **100** with automatically actuated braking devices **128** rather than hand-operated devices, for example, squeeze-and-stop brakes deployed on bicycles, include that less co-ordination and attention is required of the user. In particular, braking devices **128** are engineered such that a total load on frame **102** of less than the typical weight of a user is sufficient to cause a braking action. Hence, the pre-determined value typically lies between about 20 Newton and about 60 Newton.

Furthermore, walker **100** preferably includes front wheels **130** freely rotatable through 360° mounted on front legs **114** such that walker **100** is steerable. Front wheels **130** are preferred over pads for terminating front legs **114** so that the user does not have to tip walker **100** during ambulation. Freely rotatable front wheels **130** are preferably enabled using caster-pin locking systems including levers which move between a first position in which front wheels **130** are locked for straight line ambulation and a second position in which front wheels **130** are unlocked and can freely rotate as known in the art.

With reference now to Figure 4, handles **112** are preferably mounted on push handle tubes **132** telescopically received by segments **110** such that the height of handles **112** can be adjusted to accommodate different heights of users. Adjustment of the height of handles **112** is typically achieved by the use of height adjustment handles **134** which are threaded through one pair of a series of pairs of transverse holes **136** provided in push handle tubes **132**. The height of handles **112** is preferably adjusted so as to be half of the height of the user.

With reference now to Figures 5-7, each of braking devices **128** includes a compression spring **138** extending between a shoulder **140** rigidly attached to rear leg **120** and a shoulder **142** rigidly attached to rear wheel support **126**. There are no rigid supports connecting rear leg **120** to rear wheel support **126** and therefore each of compression springs **138** typically bears at least about 25% of the total load borne by walker **100**.

It can therefore be readily appreciated that rear leg **120** is urged toward rear wheel **124** when compression spring **138** is compressed on application of a force to frame **102**. In other words, the clearance h between lower rim **144** of rear leg **120** and rear wheel **124** is governed by the load borne by compression spring **138**. Clearance h is typically from about 1 mm to about 2 mm when frame **102** is unloaded. When sufficient load is applied to frame **102**, lower rim **144** is urged against rear wheel **124** to achieve a braking action of walker **100**. The vertical displacement of rear leg **120** with respect to rear wheel **124** is limited by the travel of an insert **146**, traversing shoulder **142**, within vertically aligned slots **148** provided in rear leg **120**.

Rim **144** is preferably configured to receive rear wheel **124** to increase the contact surface between rim **144** and rear wheel **124** to facilitate braking of walker **100**. This is achieved by preparing rim **144** with cutaway portions **144a** having the same radius of curvature as the traversal radius of curvature of the outer surface of rear wheel **124**.

In this case, slots **148** also ensure that a fixed orientation is maintained between rear leg **120** and rear wheel **124** such that cutaway portions **144a** are always aligned to be urged against rear wheel **124** to effectively brake walker **100**.

Users accomplish ambulation by repetitively rolling walker **100** forward and taking a step while relying on walker **100** for a firm footing facilitated by the automatic braking of rear wheels **124** by braking devices **128**.

With reference now to Figures 8-10, there is shown a walker, generally designated **200**, constructed and operative according to the teachings of the present invention, for traversing stairs as well as substantially level surfaces. Hence, walker **200** is adapted to provide support in three modes of ambulation: ascending stairs, descending stairs and traversing substantially level surfaces where distinction is made between ascending and descending stairs because a user takes up different postures requiring different modes of support depending on the direction that the stairs are traversed.

Walker **200** has a similar construction as walker **100** in that it includes a frame **202** fabricated from left and right upright frames **204** and **206** and a crossbar **208**. As before, frames **204** and **206** include upper segments **210** for telescopically receiving push handle tubes **212** and lower segments in the form of front legs **214** while crossbar **208** includes a generally U-shaped transverse element **216** and vertically disposed segments in the form of rear legs **218**. A second crossbar **220** can be deployed for strengthening frame **202**. A seat and a basket can also be provided as known in the art.

Furthermore, for traversing substantially level surfaces, as was previously described with reference to walker **100**, walker **200** includes a first pair of handles **222** mounted on push handle tubes **212** and braking devices **224** for stopping rear wheels **226** telescopically mounted on rear

legs **218** via rear wheel mounts **228**. As before, handles **222** are substantially deployed over and slightly forward of rear wheels **226** such that pressure applied on frame **202** during ambulation brakes walker **200**, thereby providing a firm footing for the user. Height adjustment handles **223** are employed to adjust the height H_1 of handles **222** such that height H_1 from the horizontal plane is equal to approximately half of the height of the user.

In addition, walker **200** includes elements and design considerations not featured in walker **100** for enabling the ascending and descending of stairs as now described. For descending stairs, walker **200** includes a second pair of handles **230** mounted on push handle tubes **212** and a second pair of braking devices **232** for stopping front wheels **234** telescopically mounted on front legs **214** via front wheel mounts **236**. The height H_2 of handles **230** above the stair from which the user is descending is slightly less then height H_1. As can be clearly seen in Figure 11, handles **230** are substantially deployed over front wheels **234** which carry most of the load borne by walker **200** when walker **200** is used for descending stairs. Furthermore, the line of action of the force applied by the user lies substantially midway of the horizontal projection of the wheel base between front wheels **234** and rear wheels **226**.

While for ascending stairs, walker **200** includes a third pair of handles **238** mounted on push handle tubes **240** telescopically received by additional left and right upright members **242** and **244** extending from upright members **204** and **206**, respectively. The height of handles **238** are adjustable using height adjustment handles **239** such that their height H_3 above the stair to which the user is ascending is slightly less then height H_1. As can be clearly seen in Figure 12, handles **238** are substantially deployed over rear wheels **226** which carry most of the load borne by walker **200** when walker **200** is used for ascending stairs. Furthermore, the line of action of the force applied by the user lies substantially midway of

the horizontal projection of the wheel base between front wheels **234** and rear wheels **226**.

Other design considerations implemented by walker **200** for traversing stairs having an inclination of approximately 30° are as follows. First, wheel base of walker **200** is extended to include one non-occupied stair between front wheels **234** and rear wheels **226** such that the wheel base l is typically 800 mm for rendering greater stability to walker **200**.

Second, when walker **200** is on a substantially level surface, the angle α that upper segments **210** are inclined to the vertical is approximately half of the inclination of the stairs such that the change of distance H_1 from handles **222** to the horizontal plane is equal to the change of distance H_2 from handles **230** when the user uses walker **200** to descend stairs. An advantage rendered by this design consideration is that height adjustment of handles **222** and **230** can be performed at the same time. Typically α equals 15°.

Third, when walker **200** is on substantially level surface, the angle β that handles **230** and **238** are inclined to the horizontal is approximately the same as the inclination of the stairs such that handles **230** are substantially level when walker **200** is used for descending stairs and handles **238** are substantially level when walker **200** is used for ascending stairs. Typically β equals 30°.

Fourth, when walker **200** is on a substantially level surface, the angle γ that front legs **214** are inclined to the vertical is approximately the same as the inclination of the stairs such that they are substantially vertical when walker **200** is used for descending stairs. Typically, γ equals 30°. An advantage rendered by this design consideration is that it ensures that braking devices **232** operate as effectively as possible against front wheels **234** which carry most of the load borne by walker **200** when descending stairs.

And finally, when walker **200** is on a substantially level surface, the angle δ that rear legs **218** are inclined to the vertical is approximately half the inclination of the stairs such that they are substantially vertical when walker **200** is used both for traversing substantially level surfaces and descending stairs. Typically δ equals 15°. It should be noted that δ equals 15° while γ equals 30° to accommodate the requirement that rear legs **218** are maintained substantially vertical to best ensure that braking devices **224** operate as effectively as possible against rear wheels **226** in two instances when they are rotated in a clockwise direction with respect to the vertical when traversing level surfaces and when they are rotated in a counterclockwise direction with respect to the vertical when ascending stairs.

With reference now to Figures 13 and 14, walker **200** can be designed to be foldable in a similar fashion as walker **100** (see Figure 1) by pivotably mounting crossbar **208** to left and right frame members **204** and **206** about pivot **209** and providing quick release connectors **246** for detachably connecting left and right upright members **242** and **244** to left and right members **204** and **206**, respectively. In the folded arrangement, the minimum storage dimension of walker **200** is approximately 300 mm.

With reference now to Figures 15-18, walker **200** can be designed to be foldable such that its minimum storage dimension is approximately 130 mm. In this instance, U-shaped transverse element **216** is fabricated from segments denoted **216a** and **216b** which are rotatably mounted by joints **248** onto extensions of rear legs **218** and a quick-release connector **250** such that segments **216a** and **216b** can be folded in a compass-like action. The compass-action of connector **250** is designed such that segment **216a** is rotated in a clockwise direction with respect thereto while segment **216b** is rotated in a counterclockwise direction with respect thereto during a folding operation of walker **200** from its unfolded arrangement to its folded arrangement. For safety considerations, joints

248 are designed such that segments 216a and 216b are stopped in the horizontal position when walker 200 is in its unfolded arrangement.

In a similar fashion, crossbar 220 is fabricated from segments denoted 220a and 220b rotatably connected by hinges 252 onto front legs 214 and a quick-release connector 254 such that segments 220a and 220b can be folded in a compass-like action. The compass-action of connector 254 is designed such that segment 220a is rotated in a counterclockwise direction with respect thereto while segment 220b is rotated in a clockwise direction with respect thereto during a folding operation of walker 200 from its unfolded arrangement to its folded arrangement.

With reference now to Figures 19 and 20, quick-release connectors 250 and 254 have the same construction which is now described with respect to connector 250. Connector 250 has an open position for securing segments 216a and 216b in linear alignment corresponding to the unfolded arrangement of walker 200 and a closed position corresponding to the folded arrangement of walker 200.

Connector 250 generally includes a member 256 extending between segments 216a and 216b and an open tubular-like casing 258 slidably mounted on crosspiece 216. Bar 256 is partially received in slots 260 prepared in segments 216a and 216b and is rotatably connected to segments 216a and 216b by pins 262. Casing 258 has jaws 258a and 258b and includes a handle 263 traversing threaded bores prepared in jaws 258a and 258b. Pins 264 guide the sliding of casing 258 along crosspiece 216 and check its rotation orientation with respect to crosspiece 216 while pins 266 check the displacement of casing 258 along crosspiece 216 between its open and closed positions of connector 250.

The three modes of ambulation supported by walker 200 are now described with reference back to Figures 11 and 12. After adjustment of the height of handles 222 such that they are approximately half of the height of the user, the user accomplishes ambulation over substantially

level surfaces by gripping handles **222** and repetitively rolling walker **200** forward and taking a step while relying on walker **200** for a firm footing facilitated by the automatic braking of rear wheels **226** by braking devices **224**.

On reaching descending stairs, the user grips handles **230**, which need no further height adjustment as described above, and descends the stairs by repetitively performing the following steps. First, he rolls walker **200** forward such that front wheels **234** are lowered onto the stair two stairs down from where he is standing. Second, he stabilizes walker **200** by urging rear wheels **224** against the wall between the stair that he is standing and the stair above it. And finally, he climbs down a stair while relying on walker **200** for a firm footing facilitated by the automatic braking of front wheels **234** by braking devices **232** such that he is standing on the non-occupied stair between front wheels **234** and rear wheels **226**.

On reaching ascending stairs, after adjustment of handles **238** to the height H_3, the user grips handles **238** and ascends the stairs by repetitively performing the following steps. First, he lifts front wheels **234** enough off the ground to clear the height between two adjacent stairs and then rolls walker **200** forward on its rear wheels **226**. At this time, he is typically standing toward the rear of frame **202**. Second, he stabilizes walker **200** by urging front wheels **234** against the wall between two adjacent stairs. Third, he climbs a stair while relying on walker **200** for a firm footing facilitated by the automatic braking of front wheels **234** by braking devices **232**. At this time, the user is typically standing toward the front of frame **202**.

While the invention has been described with respect to a limited number of embodiment, it will be appreciated that many variations, modifications and other applications of the invention may be made.

WHAT IS CLAIMED IS:

1. A rollable walker for traversing substantially level surfaces, the walker comprising:

(a) a frame including a pair of rear legs and a pair of rear wheel supports, said pair of legs including a left rear leg having a centerline and a left end portion terminating in a left lower rim and a right rear leg having a centerline and a right end portion terminating in a right lower rim, said pair of rear wheel supports including a left rear wheel support and a right rear wheel support, said left end portion receiving said left rear wheel support and restraining the movement of said left rear wheel support to an axial direction, said right end portion receiving said right rear wheel support and restraining the movement of said right rear wheel support to an axial direction;

(b) a pair of rear wheels , said pair of rear wheels including a left rear wheel having an axis of rotation and a right rear wheel having an axis of rotation, said left rear wheel support supporting said left wheel and said right rear wheel support supporting said right rear leg, said centerline of said left rear leg intersecting said axis of rotation of said left rear wheel, said centerline of said right rear leg intersecting said axis of rotation of said right rear wheel; and

(c) a pair of braking devices, said pair of braking devices including a left braking device and a right braking device, said left braking device including a left compression spring housed in said left end portion, said right braking device including a right compression spring housed in said right end portion, said left compression spring connected to said left

leg and said left rear wheel support and said right compression spring connected to said right leg and said right rear wheel support in such a way that the application on said frame of a downward force greater than a pre-determined value urges said lower rims against said rear wheels to brake the walker.

2. The walker as in claim 1, wherein each one of said lower rims includes a cutaway portion having the same radius of curvature as the traversal radius of curvature of the outer surface of said rear wheel such that said lower rim is configured to receive said rear wheel.

3. The walker as in claim 1, further comprising a pair of front wheels connected to said frame, said front wheels being freely rotatable such that the walker is steerable.

4. The walker as in claim 1, further comprising a seat connected to said frame for supporting a user in a sitting position.

5. The walker as in claim 1, wherein the walker is foldable.

6. The walker as in claim 1, further comprising:

(d) a pair of front legs and a pair of front wheel supports, said pair of legs including a left front leg having a centerline and a left end portion terminating in a left lower rim and a right front leg having a centerline and a right end portion terminating in a right lower rim, said pair of front wheel supports including a left front wheel support and a right front wheel support, said left end portion receiving said left front wheel support and restraining the movement of said left front

wheel support to an axial direction, said right end portion receiving said right front wheel support and restraining the movement of said right front wheel support to an axial direction;

(e) a pair of front wheels, said pair of front wheels including a left front wheel having an axis of rotation and a right front wheel having an axis of rotation, said left front wheel support supporting said left wheel and said right front wheel support supporting said right front leg, said centerline of said left front leg intersecting said axis of rotation of said left front wheel, said centerline of said right front leg intersecting said axis of rotation of said right front wheel; and

(f) a second pair of braking devices, said second pair of braking devices including a left braking device and a right braking device, said left braking device including a left compression spring housed in said left end portion, said right braking device including a right compression spring housed in said right end portion, said left compression spring connected to said left leg and said left front wheel support and said right compression spring connected to said right leg and said right front wheel support in such a way that the application on said frame of a downward force greater than a pre-determined value urges said lower rims against said front wheels to brake the walker.

7. The walker as in claim 6, wherein each one of said lower rims includes a cutaway portion having the same radius of curvature as the traversal radius of curvature of the outer surface of said rear wheel such that said lower rim is configured to receive said rear wheel.

8. The walker as in claim 6, wherein said frame includes a first pair of handles for use while traversing the walker over substantially level surfaces and while ascending stairs.

9. The walker as in claim 8, wherein said frame includes a second pair of handles for use while descending stairs.

10. The walker as in claim 9, wherein said second pair of handles are substantially horizontal while descending stairs.

11. The walker as in claim 1 adapted for traversing stairs inclined at an angle ϕ to the horizontal, the walker further comprising: a pair of front legs assuming an angle approximately equal to ϕ to the vertical when the walker rests on a substantially horizontal surface such that said pair of front legs assume a substantially vertical position when the walker rests on stairs.

12. The walker as in claim 11, wherein said pair of rear legs assume an angle approximately equal to $\phi/2$ to the vertical when the walker rests on a substantially horizontal surface.

13. The walker as in claim 12, wherein said pair of front legs and said pair of rear legs rest on stairs separated by a single non-occupied stair when the walker is employed for traversing stairs inclined at an angle ϕ to the horizontal.

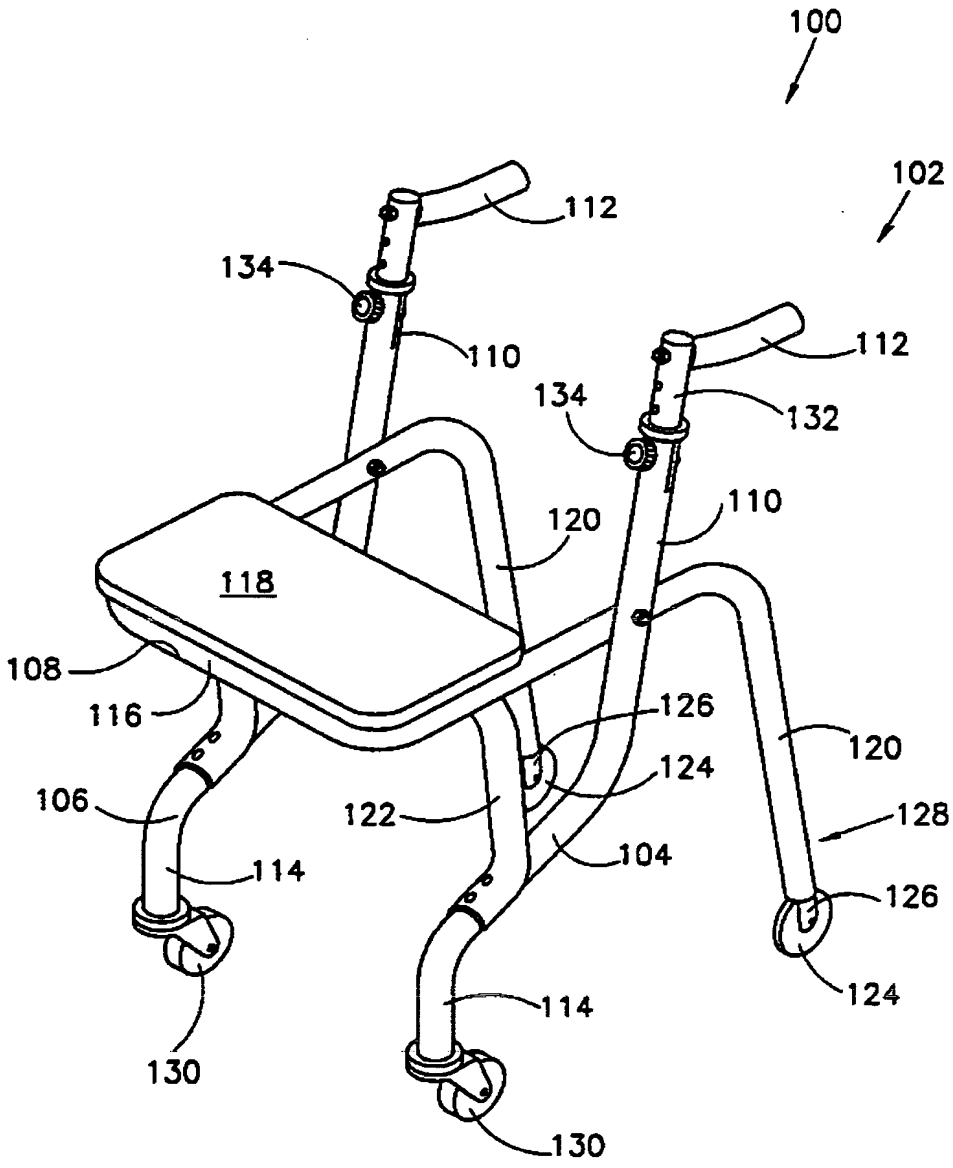
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FIG. 1

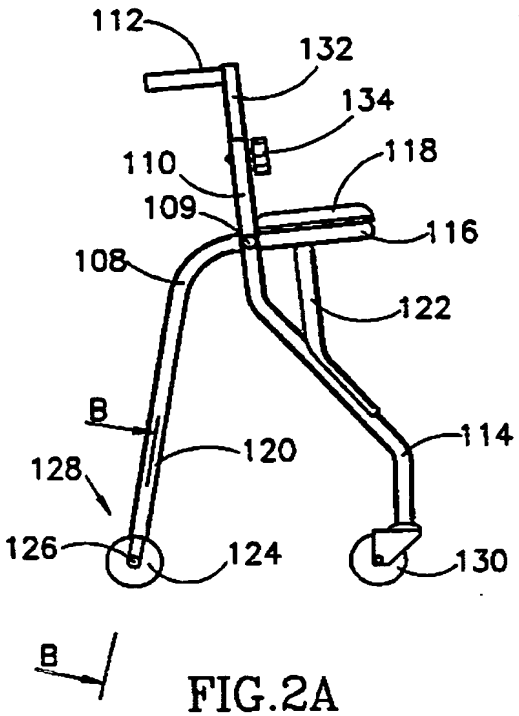


FIG.2A

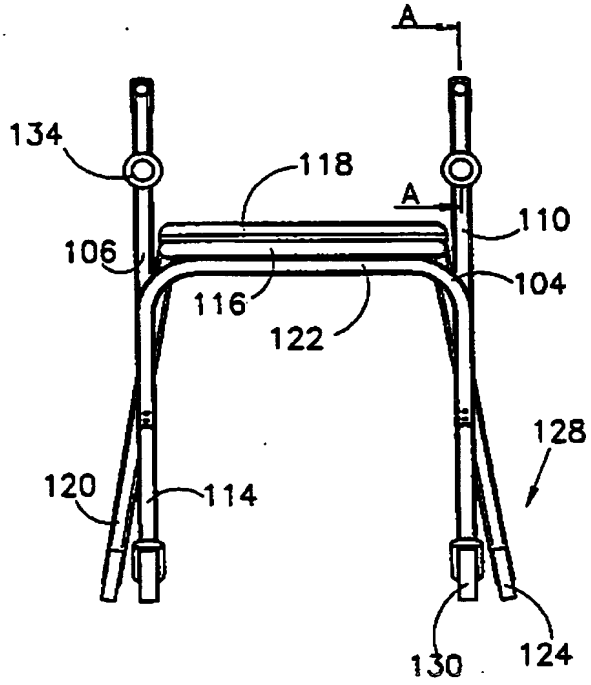


FIG.2B

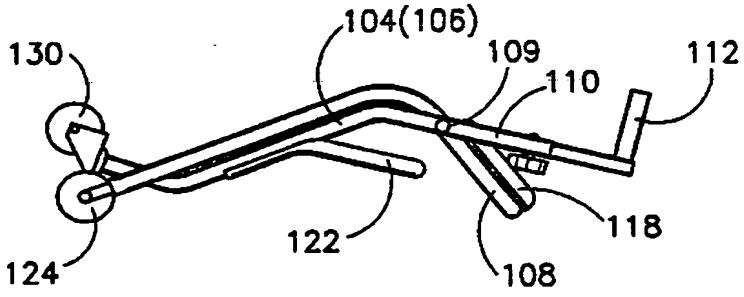


FIG.3

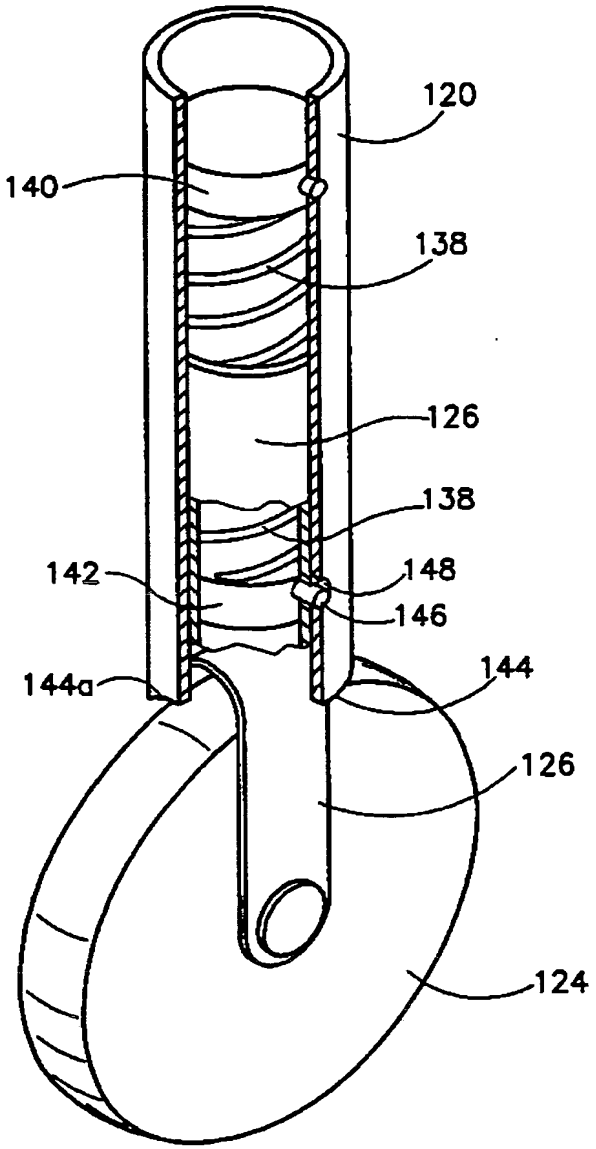
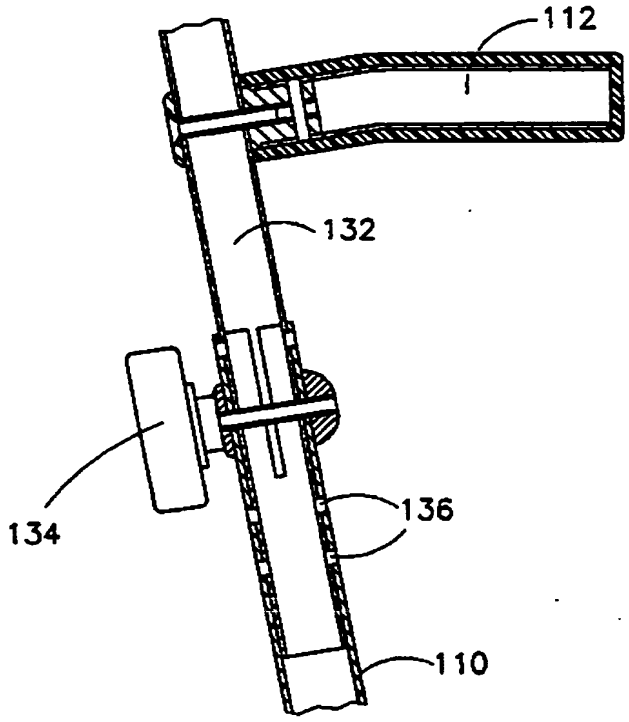
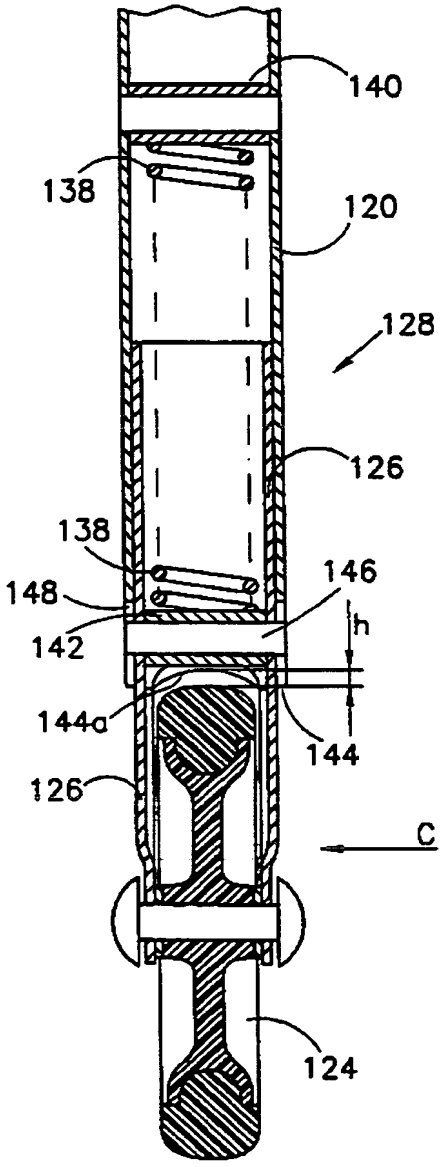


FIG.5

FIG.4





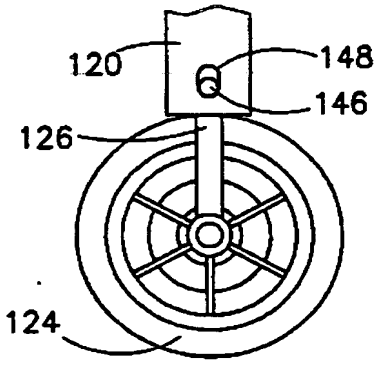
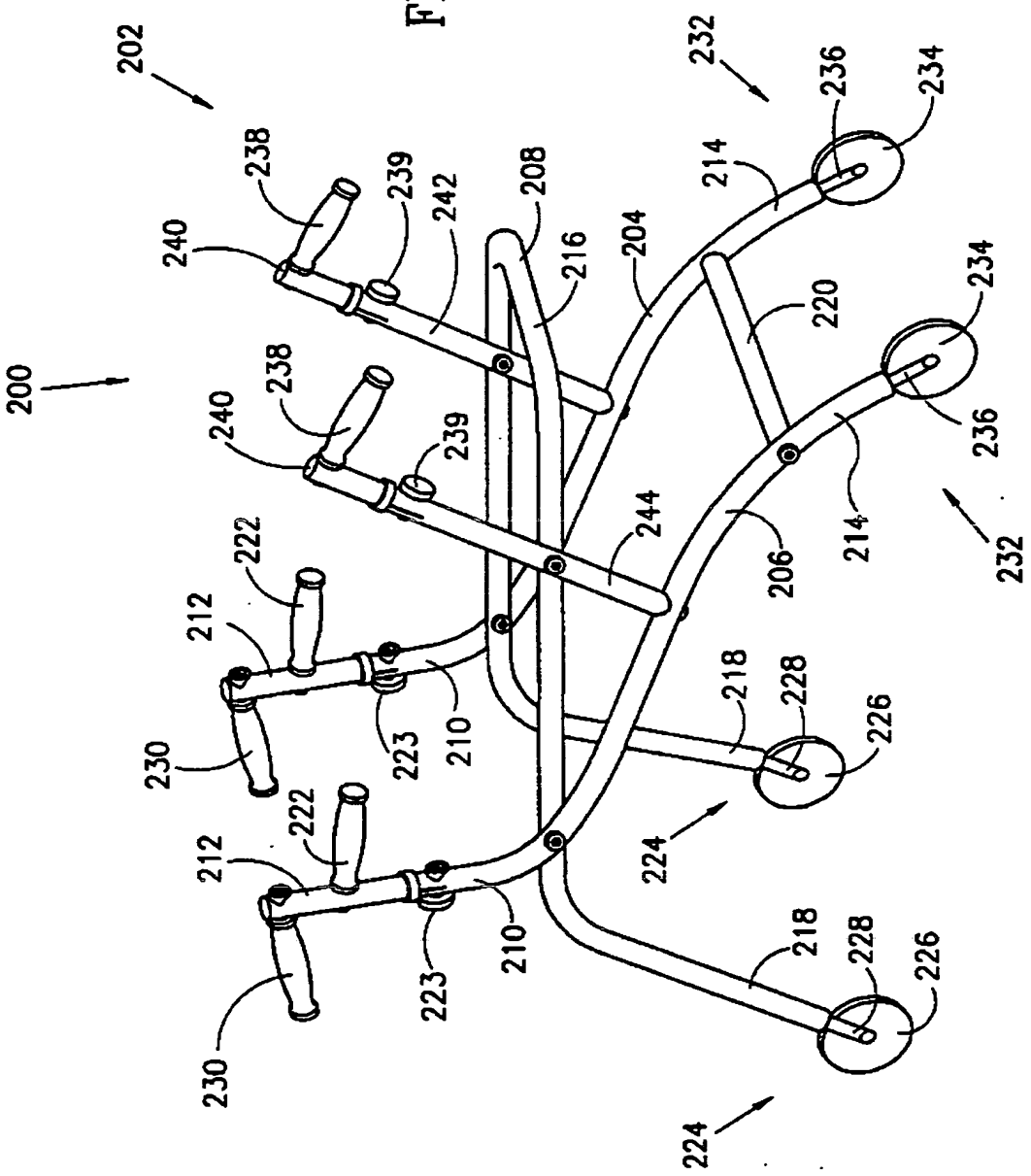


FIG.7

FIG.6

FIG.8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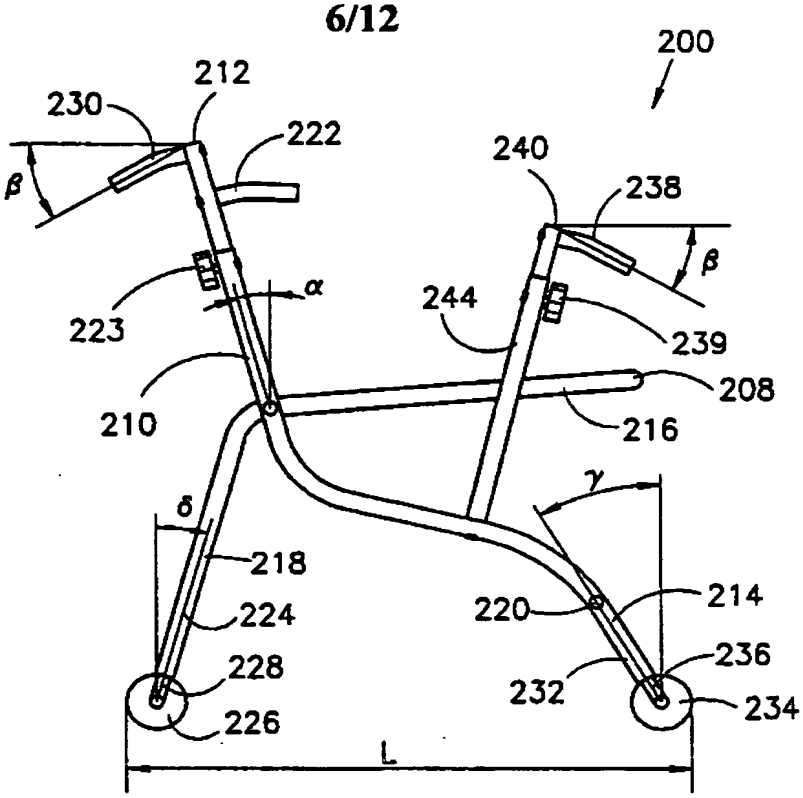
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FIG.9

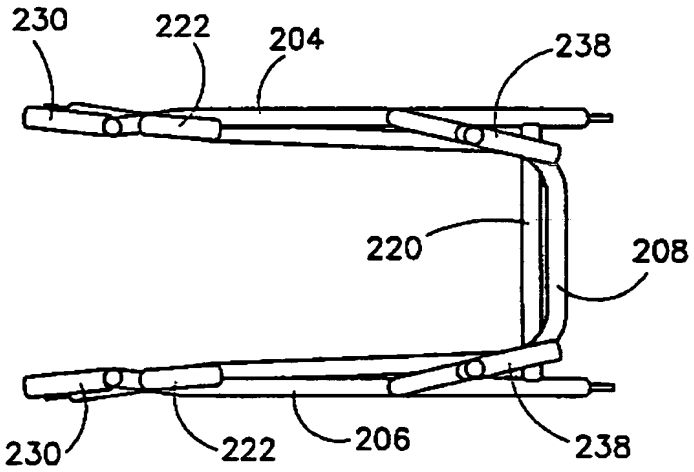
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FIG.10

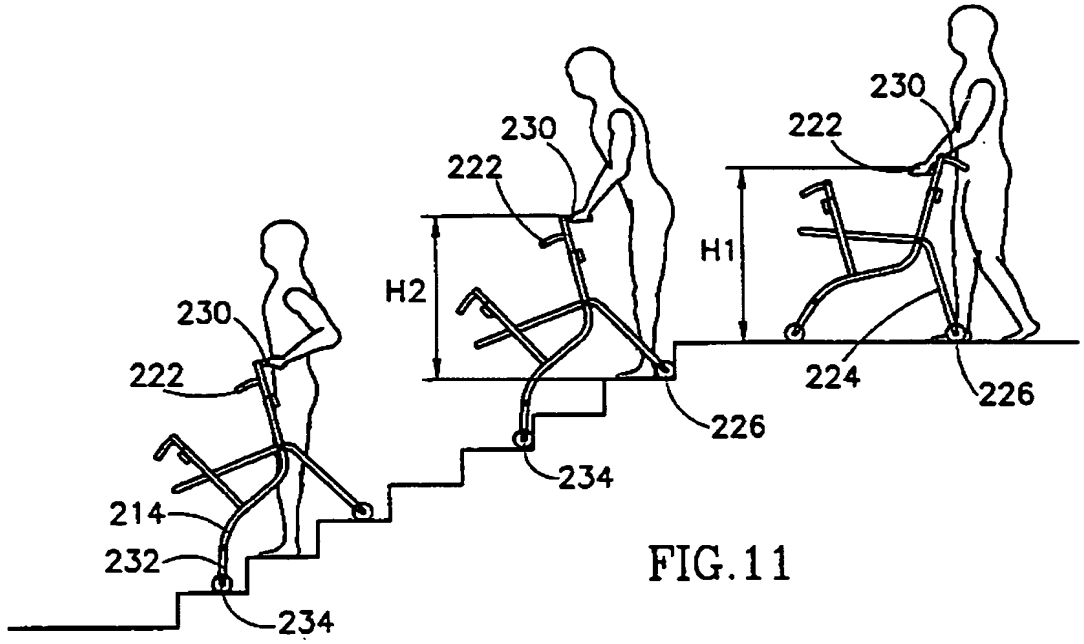
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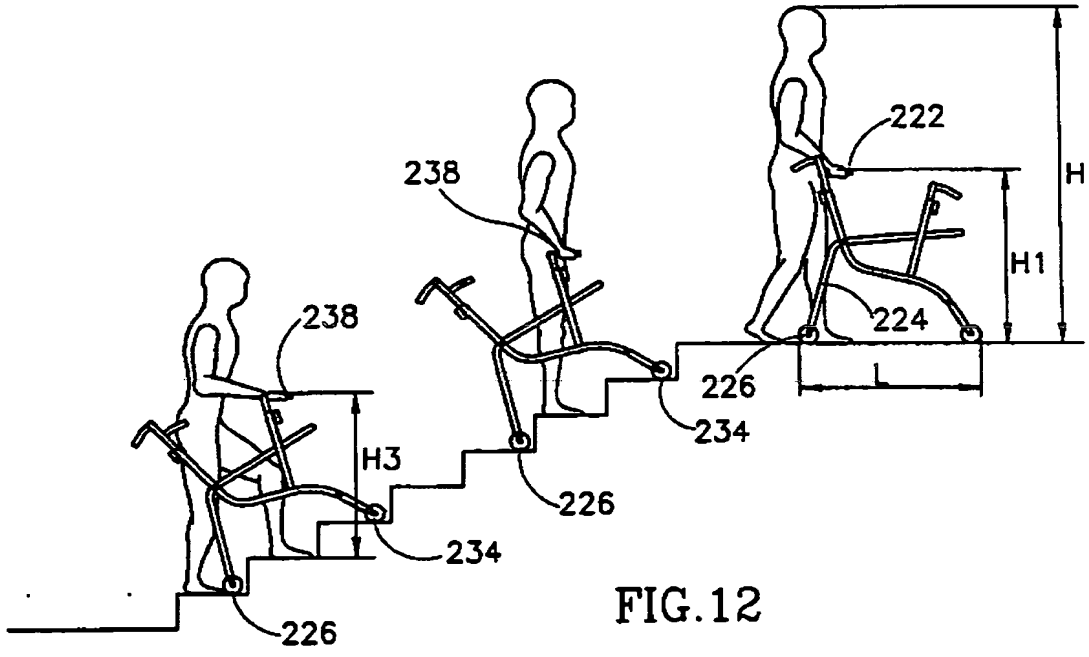
FIG.11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H1
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H3
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226

FIG.12

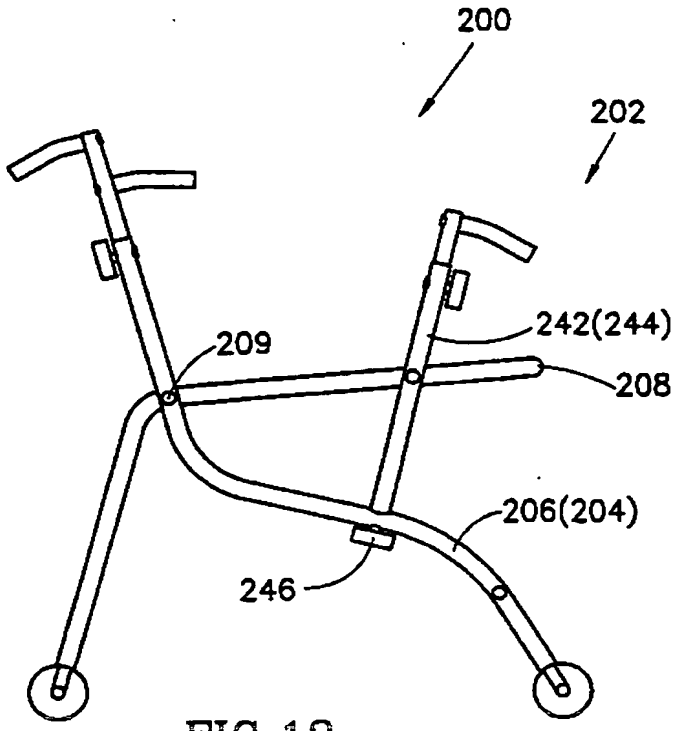
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FIG.13

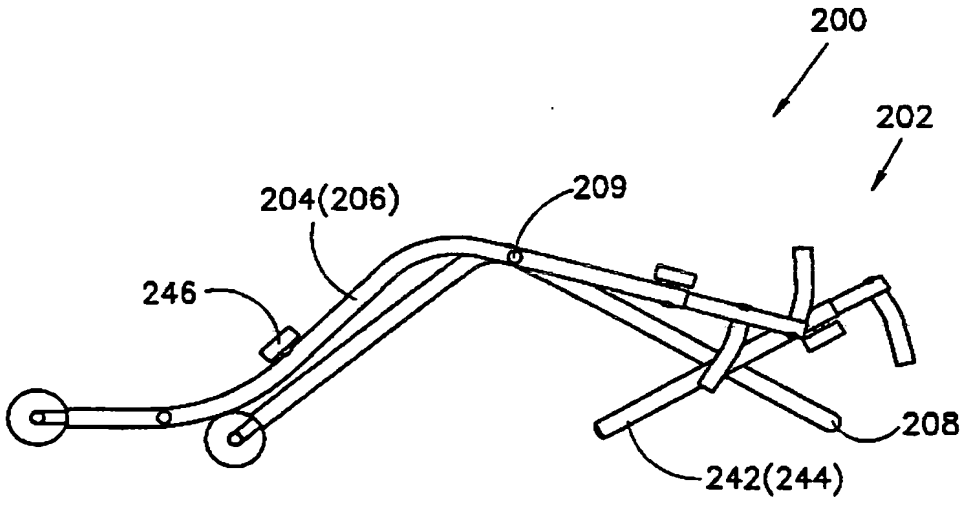
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FIG.14

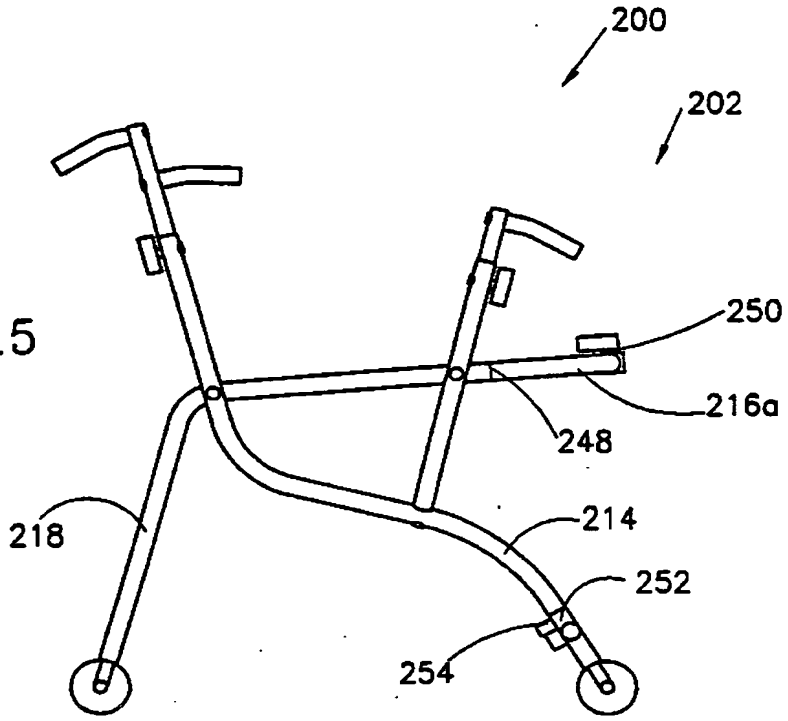
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FIG.15

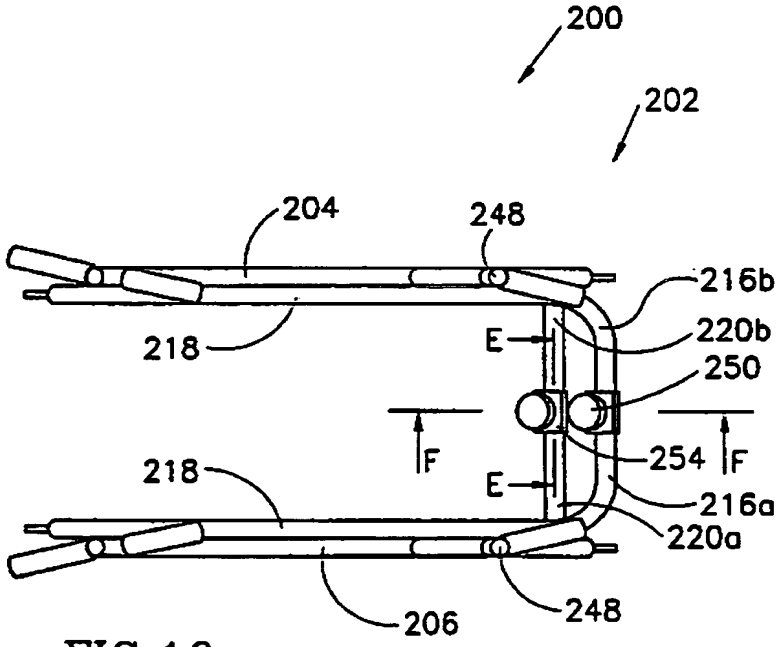
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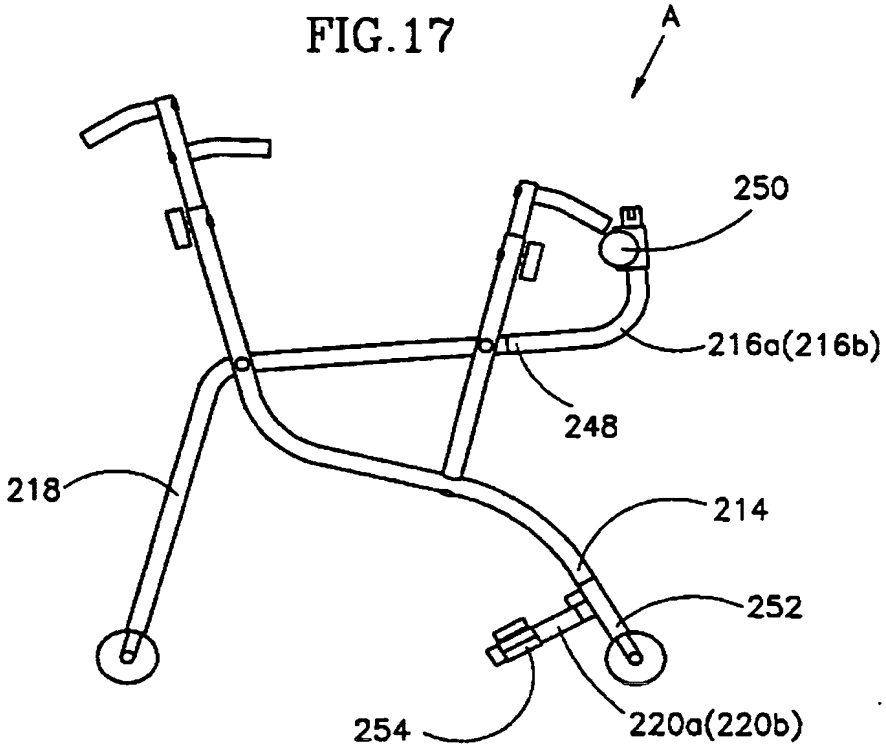
FIG.16

FIG.17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220a(220b)

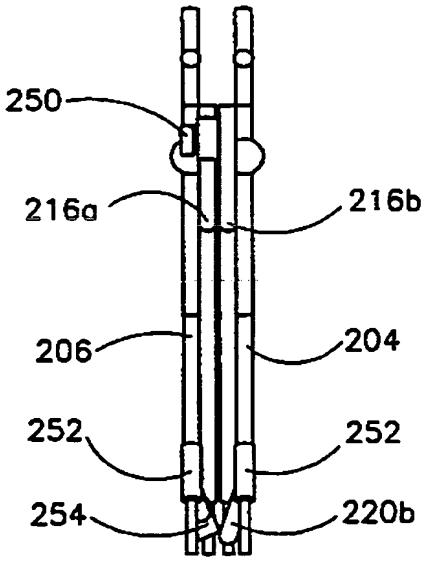
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FIG.18

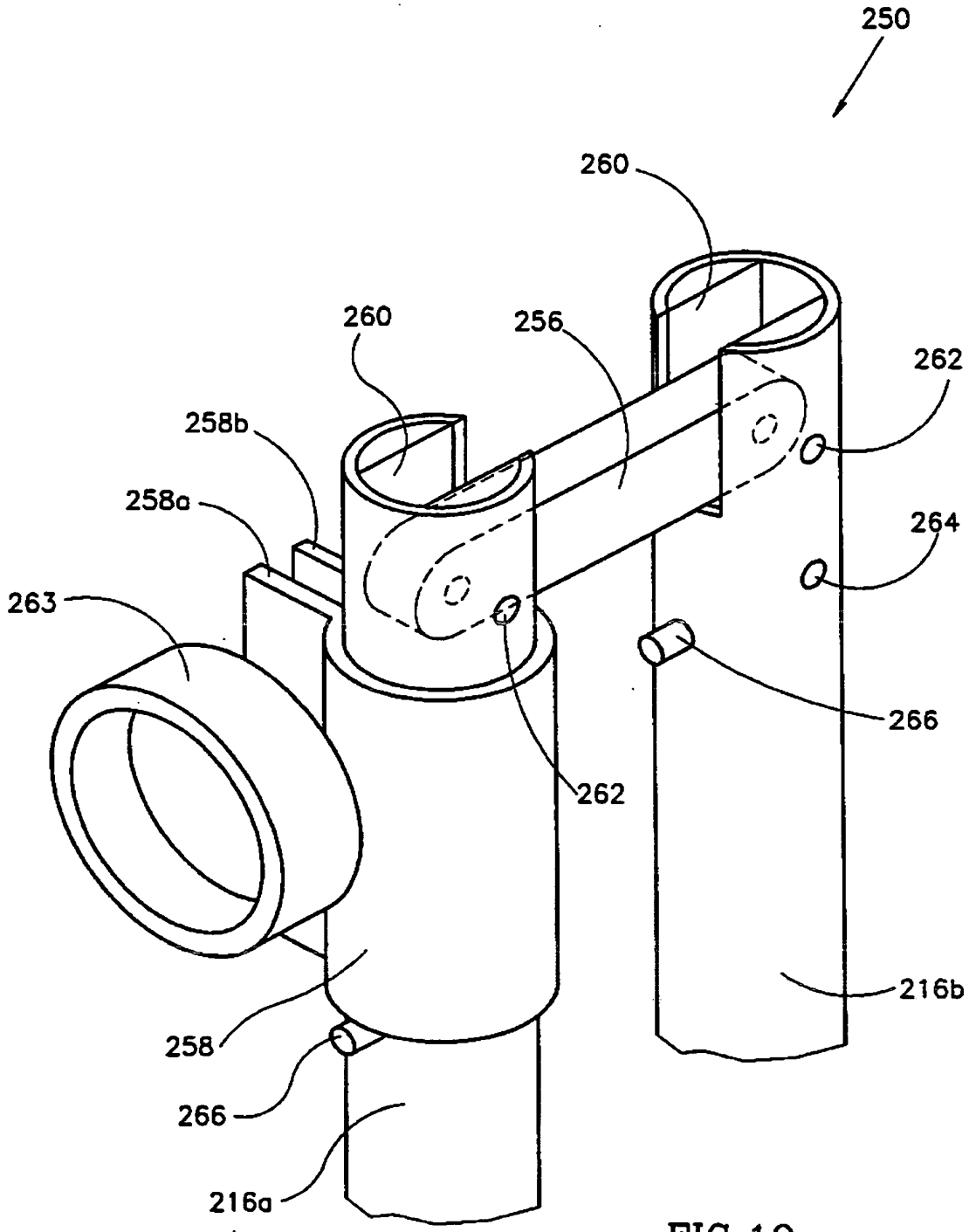

FIG.19

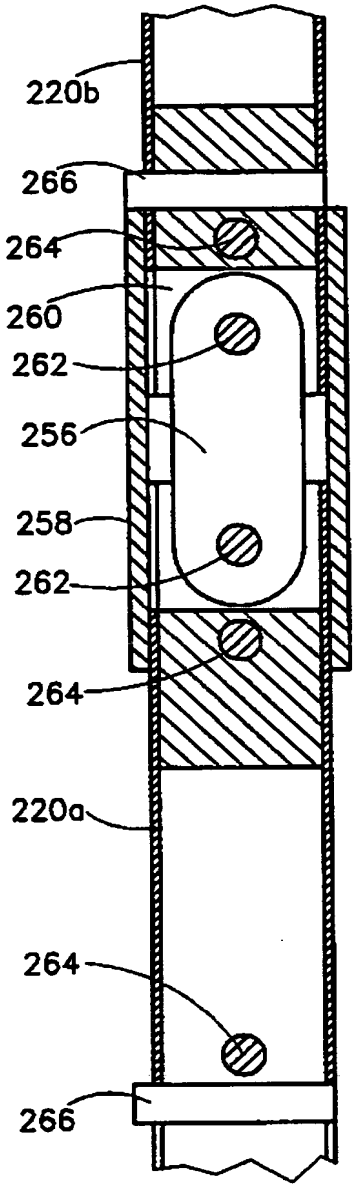

FIG.20A

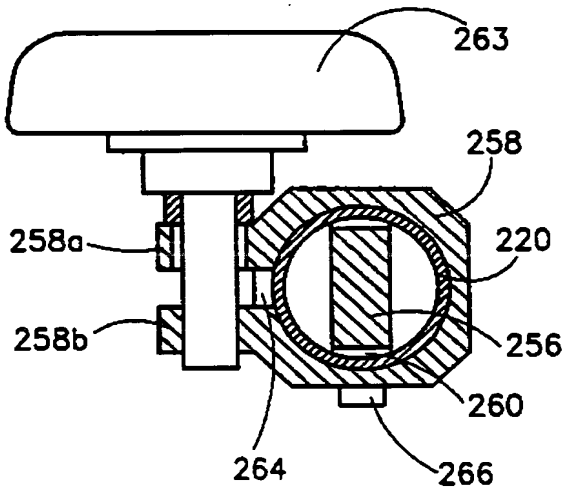

FIG.20B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/03990

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61H 3/04
US CL :Please See Extra Sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,271,422 (SORRELL) 21 December 1993 (21-12-93) See Entire Document	1-13
Y	US, A, 3,237,940 (JOHNSON) 22 October 1963 (22-10-63) See Figures 2 and 3	1-13
Y	US, A, 4,907,794 (ROSE) 13 March 1990 (13-03-90) See Entire Document	5
Y	US, A, D181,957 (CALLAHAN) 11 April 1956 (11-04-56) See Entire Document	9, 10

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 02 AUGUST 1995	Date of mailing of the international search report 15AUG1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Anne Marie Boehler Telephone No. (703) 308-0422

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/03990

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,643,211 (MORRIS) 17 February 1987 (17-02-87) See Entire Document	1-13
A	CA, A, 2,056,148 (MCFARLAND) 26 March 1993 (26-03-93) See Figure 1.	1-13
A	GB, A, 1,342,397 (SCOTT) 3 January 1974 (03-01-74) See Entire Document	1-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/03990

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

280/87.021; 135/67; 188/68; 297/5;
482/68

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

280/87.021; 135/67; 188/68; 297/5;
482/68
280/250.1,30,87.021,87.05,87.051; 297/5.6;
188/1.12,19,68,69; 135/67; 482/66,67,68